

Umpqua River Sediment Evaluation

INTRODUCTION

1. The mouth of the Umpqua River is located 180 miles south of the Columbia River in Oregon's mid coastal region. The Umpqua drainage system covers 4,560 square miles. The river originates in the Cascade mountains and it delivers 6,700,00 ac-ft annually to the Pacific Ocean. The estuary of the Umpqua covers approximately 6,430 acres (1) and is the third largest in Oregon. Tidal water can extend up river to the town of Scottsberg at River Mile (RM) 27.5.

2. The Federally authorized channel consists of an entrance channel 26 feet deep and 200 feet wide; a river channel 22 feet deep and 200 feet wide to Reedsport (RM 11.9); and a turning basin at Reedsport 22 feet deep, 600 feet wide and 1,000 feet long. A side channel 12 feet deep and 100 feet wide extends into Winchester Bay with a mooring basin 12 feet deep, 175 feet wide and 300 feet long located at its inner end. Another side channel 22 feet deep and 200 feet wide extends from RM 8.0 to Gardiner and includes a turning basin 500 feet wide and 800 feet long.

3. Physical and chemical analyses of potential dredge material was conducted to provide a technical evaluation as required by sections 401 and 404 of the Clean Water Act (CWA) and the Marine Protection Research and Sanctuaries Act (MPRSA). The evaluation prior to dredging is necessary to determine if significant environmental impacts will result from dredging or disposal operations.

PREVIOUS STUDIES

4. Previous studies of Umpqua River sediment were conducted in 1970-71, 79, 80, 87-88 and 89. Results of these studies revealed the sediment, especially in main channel areas, to be predominantly fine grained sands with a low organic content. Sediment from the side channels of Winchester Bay grade from fine sands in the entrance areas in each channel to sediments high in fines, clay and organic content in the dock areas. Gardiner Channel sediments are fine grained sands low in organic content. The 1980 study was the most extensive and it sampled sediments from all areas of the federal project from RM 1.8 to RM 11.4 including the main channel, side channels and turning basins (2). Bulk sediment samples were analyzed for metals, pesticides, PCBs and nutrients. Elutriate tests were also performed to measure releases of contaminants to receiving waters during proposed disposal operations. Standard water quality parameters were measured at various locations. Based on the results of the 1980 study, Umpqua River sediments were considered acceptable for in-water disposal at sites in the Umpqua River and the ocean. Upland disposal was also acceptable. In 1979, liquid phase, solid phase and suspended particulate phase bioassays were conducted on Winchester Bay sediment to test for acceptability of in-water disposal (3). The bioassays showed that the sediment was not toxic to benthic invertebrates except perhaps to one organism, a burrowing amphipod, Rhepoxynius epistomus, in the solid phase test. The solid phase mortality was thought to be due to grain size differences between Winchester Bay sediment and that preferred by the organism. The 1987-88 study was conducted to monitor the effects of in-water disposal of fine grained, highly organic material from Winchester Bay on the benthic invertebrate community at RM 0.9 (4). The results showed an increase in the numbers of benthic invertebrates after disposal,

probably because of transfer of organisms from the dredge site to the disposal site. The 1989 study was of sediment from Gardiner Channel (5). The sediments sampled were primarily fine grained sands. A couple of samples contained layers of fine grained material that were sub-sampled and subjected to chemical analyses. Pesticides, PCBs and PAHs were undetected. Metals were below concern levels and TOC was around 1.3 %. The Gardiner Channel material was acceptable for unconfined in-water disposal. Recent dredging of the Gardiner Channel during the summer of 1991 revealed a location where there is possible contamination by Bunker C oil. While dredging off the fueling dock, at RM 8.4, an oily substance was seen bubbling to the surface. Dredging operations were stopped, two water sample was taken for analysis and a video was taken of the river surface where the oil was observed. The water sample was sent out for analysis and the oily substance was identified as Bunker C fuel oil. The need for future dredging in the area is being evaluated. Dredging will avoid this location until further analysis and delineation of the contamination is completed. The source of the oil is unknown at this time.

5. Reports and raw data from these previous studies are on file at the USACE, Portland District offices.

PRESENT STUDY

6. In September 1991 samples were taken from shoals in the main channel and from the turning basins in Gardiner Channel and near Reedsport Docks. Physical analyses including grain size and Dredge Tests (volatile solids, resuspended density, void ratio and specific gravity) were conducted on all samples. Chemical analyses were performed on one sample where there was reason to believe contamination might exist because of potential nearby sources of contamination (Reedsport Docks).

7. Ten samples were also taken in the two channels leading into Winchester Bay. Results from Winchester Bay sampling stations were presented in a separate report entitled "Update on Suitability of Winchester Bay Sediment for Development of Wetlands Habitat in Constructed Dunal Ponds on the North Spit of the Umpqua River" (6). The results confirmed previous studies of Winchester Bay material which concluded that the material was acceptable for unconfined in-water disposal. In summary, metals and tributyltin were below concern levels. Pesticides and PCBs were undetected. However, because of analytical problems, another sample was obtained for PAHs analysis and we are awaiting the results. Past studies of PAHs in Winchester Bay sediment have shown them to be below concern levels.

PHYSICAL/CHEMICAL RESULTS

8. The mean grain size of Umpqua River sediments was 0.27 mm which is in the range of medium to fine sands. They were predominantly sand (99.6 %) with a small fraction of fine grained material (Table 1). The sand particle roundness grading was subangular to subrounded. The mean resuspended density was 1,784 gms/L, the mean void ratio was 1.157, volatile solids averaged 1.7 % and the mean specific gravity was 2.684. Sample U-3 from the turning basin at Reedsport docks was analyzed for chemical contamination (Table 2). Metals, were below established concern levels. Pesticides, PCBs and PAHs were undetected. Detection limits for Pesticides, PCBs and PAHs were slightly above recommended limits. However, based on results from past studies of the sediments there is no reason to believe these parameters exceed concern levels. These past studies have shown the material to be clean estuarian sands.

CONCLUSIONS

9. In conclusion, the Umpqua River sediments are acceptable for unconfined in-water disposal according to guidelines of the CWA and MPRSA. This includes the main channel, the two turning basins, Winchester Bay channels and Gardiner Channel except as noted below. Most of the Umpqua River sediments meet the exclusionary criteria of the CWA and the MPRSA and are exempt from further testing requirements. The fine grained Winchester Bay sediments are considered acceptable for in-water disposal because the sediments are not significantly contaminated and are not significantly different from past Winchester Bay sediments which have passed bioassay tests. The area of the Gardiner Channel where the Bunker C fuel oil was found should not be dredged until the source is located and the extent of the problem is identified.

10. If you have any questions regarding this sediment evaluation, please contact Jim Britton, Planning and Engineering, Reservoir Regulation and Water Quality Section (326-6471).

TABLE 1.

Results of grain size analyses and dredge tests of Umpqua River sediment samples.

sample	resuspended density	void ratio	volatile solids	specific gravity	volatile solids	mean gr. size
	gms/L		%			
U - 1	1716	1.331	2.1	2.670	2.1	0.21
U - 2	1839	1.003	0.9	2.680	0.9	0.27
U - 3	1825	1.061	1.5	2.701	1.5	0.34
U - 4	1755	1.231	2.1	2.684	2.1	0.27
mean	1784	1.157	1.7	2.684	1.7	0.27

The mean percent sand for all samples was 99.6 %.

TABLE 2.

Results of chemical analyses of sediment from Reedsport Docks turning basin.

sample	metals								TOC	AVS
	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn		
	ppm								%	μmoles/g
U - 3	3	nd	27	9	nd	32	4	35	0.16	nd
DL*	1	0.1	1	1	0.02	1	1	1	0.05	0.1

* detection limit

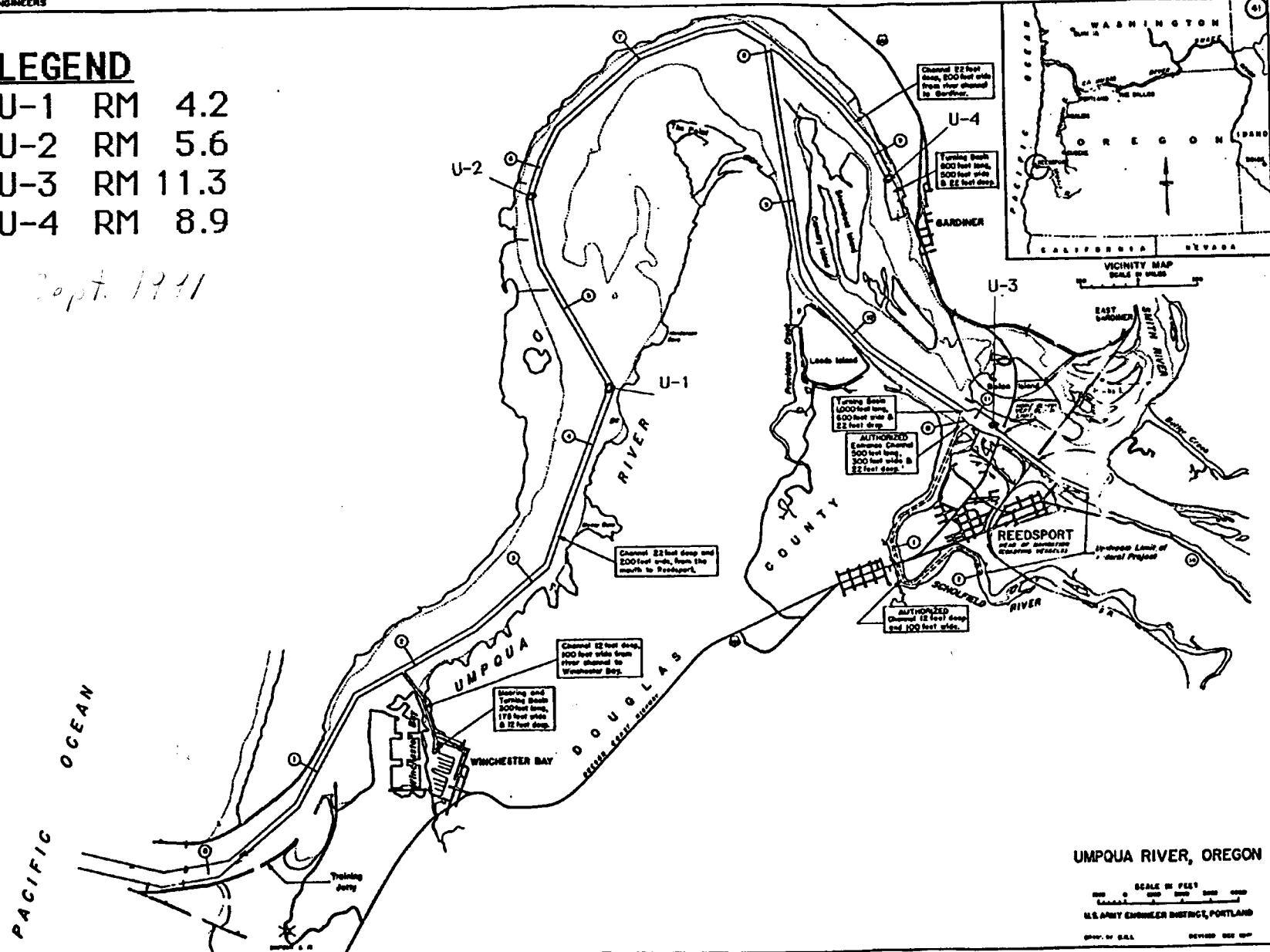
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Figure 1
CORPS OF ENGINEERS

LEGEND

U-1	RM	4.2
U-2	RM	5.6
U-3	RM	11.3
U-4	RM	8.9

Sept. 1941



UMPQUA RIVER, OREGON

SCALE IN FEET
0 100 200 300 400 500
U.S. ARMY ENGINEER DISTRICT, PORTLAND

DESIGNED BY S.E. DEVELD 1932

REFERENCES

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